Timely Topics September 2024

Florida Cracker: a heritage breed with natural resistance to internal parasites

American Consortium for Small Ruminant Parasite Control

Introduction to Florida Cracker Sheep

Florida Cracker sheep are a historic breed with a rich heritage, dating back to the Spanish colonization of Florida in 1565. These sheep, believed to be descendants of the Churro sheep, have adapted over nearly 400 years to the warm, humid conditions of Florida. They are renowned for their natural resistance to parasites and their ability to tolerate high temperatures. Despite their unique traits and historical significance, Florida Cracker sheep are currently listed as an endangered species due to declining numbers.

The Florida Cracker is a heritage breed that shows natural resistance to internal parasites, as well as tolerance to heat.

Parasite Resistance Explained

Parasite resistance in livestock refers to an animal's capacity to mount an effective immune response against gastrointestinal parasites. This trait involves both innate and acquired immune responses. Although resistant animals still shed parasite eggs, the quantity is significantly reduced compared to non-resistant animals. Effective parasite resistance is characterized by lower fecal egg counts (FEC) and favorable FAMACHA© scores, which require proper training for accurate assessment.

For selecting parasite-resistant sheep, the key is to consistently choose animals based on their low FEC (less than 900 eggs per gram) and FAMACHA© scores of 1 or 2. Breeding programs focused on enhancing parasite resistance involve detailed animal and pedigree records, ensuring that genetic improvements are sustained over time. Enhanced parasite resistance not only benefits the individual animals but also reduces pasture infectivity, thereby supporting the overall health of the flock, including susceptible and young sheep.

Genetics Behind Parasite Resistance

Florida Crackers are dual purpose: meat and wool

Since 2018, research has delved into the genetics underlying parasite resistance in Florida Cracker sheep. These studies have identified a moderate heritability for traits such as FEC (0.33) and FAMACHA© scores (0.31), with a genetic correlation of 0.51 between these traits. This suggests that selecting for FAMACHA© scores can effectively improve parasite resistance, as this trait is relatively easy to record and has a high heritability.

Advancements in genomic technologies, particularly next-generation sequencing, have allowed researchers to pinpoint specific genetic regions associated with parasite resistance. Genome-wide association studies (GWAS) have been instrumental in this process, enabling the identification of DNA variants linked to resistance traits. Genes involved in immune responses, including CCL1, CCL2, CCL8, CCL11, CCL26, CFI, CSF3, CXCL10, GPX2, IL2RB, IL16, ITGA4, MUC15, NOS2, PCDH7, STAT3, STAT6, TLR3, and TNF, have been associated with FEC, FAMACHA scores, and packed cell volume (PCV). These findings highlight that parasite resistance is a polygenic trait, influenced by multiple genes with small individual effects.

Immune mechanisms in Florida Cracker Sheep

The understanding of the genetics controlling gastrointestinal parasite resistance requires an understanding of the mechanisms of immunity. Gastrointestinal parasite resistance utilizes innate and acquired immune mechanisms to limit the establishment and fecundity of the gastrointestinal parasites. The innate response is initiated by the recognition of the pathogen-associated molecular patterns (PAMP) by host pattern recognition receptors. In contrast, the acquired immune response requires days to develop and involves B cell and T cell mechanisms. In Florida Cracker sheep, genetic studies have identified Th2, Th17 and Treg responses, and IgE production as the key mechanisms of protection against gastrointestinal parasitism. More studies are needed to better understand the immune mechanisms utilized by this breed to combat gastrointestinal parasites.

Concluding remarks

Florida Cracker sheep are notable for their superior resistance to gastrointestinal parasites, making them one of the most resilient breeds in the US. Their unique genetic traits offer valuable opportunities for improving parasite resistance in sheep breeding programs. However, to fully harness these benefits, ongoing research is essential to deepen our understanding of the immune mechanisms involved. Additionally, conservation efforts are crucial to protect and preserve this endangered breed, ensuring that its valuable traits continue to benefit future generations of sheep.

Additional conservation efforts are needed to rescue this important breed from extinction.

Selected References

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